

IDAHO DEPARTMENT OF FISH & GAME

Jerry M. Conley, Director

Annual Project Report

Rapid River Hatchery



IPC - 17 Evaluation of Spring Chinook Salmon
Emigration, Harvest and Returns to
Rapid River Hatchery, 1980

IPC - 13 Report of Operations at Rapid River
Hatchery, 1980

Period Covered: October 1, 1979 to September 30, 1980

by

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Evaluation of Spring Chinook Salmon Emigration, Harvest and Returns to Rapid River Hatchery - 1980.

Report of Operations at Rapid River Hatchery - 1980.

ABSTRACT

During the period from 1 October 1979 to 30 September 1980, approximately 2,604,823 chinook smolts were planted into Rapid River from the 1978 brood. An additional 157,440 fish were transferred to the Lochsa drainage during April 1979.

On 1 October 1979, approximately 4.3 million eggs were on hand from adults spawned in August and September 1979. The resulting fish, nearly 3.2 million, were ponded at Rapid River Hatchery during May 1980. Red River pond, in the Clearwater drainage, received 293,250 fish from this brood year.

During late summer, approximately 989,531 fish migrated from the rearing ponds, leaving 2,387,884 fish on hand at the end of the fish year. Smolt plants, from this group, will occur during the spring of 1981, and will include a 1 million release in the Hells Canyon area of the Snake River.

Net production from this hatchery, for the fish year, was 229,689 pounds (104,167 kg). We fed 273,450 pounds (124,014 kg) of Oregon Moist pellet feed for a total cost of \$91,269.11. The resulting feed conversion was 1.19:1. The fish feed cost for each kg of fish flesh produced was \$1.14 (\$.397/lb). When all costs were included, each kg of production cost \$1.55 (\$.704/lb).

The upstream migrant trap was installed on 4 April 1980 and was operated through 30 July 1980. Fish classed as spring chinook entered the trap from 12 May through 23 July 1980 and totaled 1,960. Fish classed as summer chinook totaled only 25 and were released above the trap to spawn in Rapid River. The peak of the run occurred during the week of 9 June. Other species entering the trap this season included steelhead, Dolly Varden, rainbow trout, cutthroat, and whitefish. No rough fish were observed.

The age-class composition of this year's spring chinook run showed 432 three-year-olds (jacks) or 22%; 1,482 four-year-olds or 76%; and 46 five-year-olds or 2%. The run total, 1,960, was comprised of 696 males, 832 females and 432 jacks. All chinook adults were held for spawning. Chinook returning to Rapid River made up approximately 3.2% of the total spring chinook counted over Bonneville Dam and 29% of the Lower Granite Dam count.

All fish arriving at the trap were examined and measured. Fish showing symptoms of Nitrogen Bubble disease totaled 113 or 5.8%. We saw 106 fish, or 5.6%, with gaff wounds; 77 fish, or 3.9%, with gillnet damage; 10 fish, or 0.5%, with hooking wounds, and 8 fish, or 0.4%, classified as "other" injuries. These injuries significantly contributed to the number of mortalities at the hatchery. Mortalities occurring at the trap totaled only 10 fish, or 0.5%, this year.

We ponded 1,528 adults at the hatchery and lost 192 males and 289 females prior to spawning, a total of 481 fish, or 30%. The total loss percentage, including trap and pre-spawning mortalities, was 30.5%. Malachite Green was used with limited success this season to control fungus on adult chinook.

We continued to use drug injections of Erythromycin administered to adults as they arrived at the trap. Also, an uninjected group of 135 fish were used as a control to monitor mortality differences. Drug injections were discontinued after 17 July and virtually no evidence of Kidney Disease was observed in either group.

Spawntaking operations for this fish year started on 9 August and were completed on 8 September 1980. A total of 543 females were spawned to produce approximately 1,757,000 eggs. Nearly all females were four-year-olds, which produced an average of 3,235 eggs per female. The eggs this season averaged 111/ounce (3.91/ml), and were water hardened in a 2 ppm solution of Erythromycin. All eggs were kept at Rapid River Hatchery this year and 94.5% survived to eye-up. Eggs on hand at the end of the fish year totaled approximately 1.7 million.

The estimated number of visitors to this facility totaled approximately 3,500. A decline in the number of visitors compared to the average of past years was noted.

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OBJECTIVES

1. Evaluate brood year returns of spring chinook salmon to Rapid River Hatchery.
2. Inventory other fish species entering the trap facility.
3. Report all functions and operations of this hatchery, including disease problems, etc.
4. Report the distribution of fry, fingerlings, and smolts from this hatchery.
5. Estimate sport harvest, if any, of salmon from Rapid River Hatchery taken in the Salmon River drainage.
6. Report all improvements, list needed modifications and record public relations items encountered during the year.

TECHNIQUES USED

Marking and Evaluation of Downstream Migrants - 1978 Brood

The Idaho Department of Fish and Game fish tagging trailer was at Rapid River during November 1979 and again in the spring. During this period, approximately 127,000 chinook smolts were marked with an adipose fin clip and coded wire tag. Approximately 96% of all fish marked retained this tag after the marking projects. The marking was not at Idaho Power Company cost.

Upstream Evaluation of Fish Species and Numbers

The upstream migrant trap was installed on 4 April and operated through 30 July 1980. All arriving fish species were examined and recorded. During this time, records were kept of all wounds, marks and tags. Length measurements were taken on all chinook to determine age-class by length frequency. Snouts were also taken after spawning from all adults having an adipose fin clip, and the snouts sent to coded wire tag personnel for examination.

Hatchery Operations, Disease Control Measures

Daily records were kept of all hatchery operations. All disease problems and control measures were recorded in a permanent "disease log".

Conversion Rates

Conversion rates were calculated from hatchery records kept during the fish year.

Harvest Information

No sport fishery was allowed on chinook salmon this year, due to the low numbers of salmon entering Idaho. Indian fishing on Rapid River contributed to the low numbers of spring chinook arriving at the trap. An accurate estimate of the Indian harvest is not available at this time.

Brood Year and Age-Class Composition - 1980 Returns

All spring chinook arriving at the trap facility were examined and measured. Brood year origin and age-class were determined by using length frequency curves. Coded wire recoveries at the hatchery also provided brood year information.

Summer Chinook Enumeration

Chinook adults arriving at the trap after 23 July were classed as summer run fish. During the remaining trapping period, only 25 fish had been counted. The trap was removed from operation on 30 July 1980.

FINDINGS

Spring Chinook Smolts - 1978 Brood Year

Enumeration, Marking and Evaluation of Downstream Migrants

Smolt plants in Rapid River from the 1978 brood year totaled approximately 2,604,823 during the fish year. These fish averaged 136.0 mm in length and 15.0 per pound (33.0/kg).

The 1978 brood smolts were the progeny of adult parents that had all been injected with Erythromycin at the trap. During spawntaking operations, all 1978 brood eggs were also water hardened in Erythromycin at a 1 ppm level. Work done by the National Marine Fisheries Service, at Rapid River Hatchery this past spring, indicated that the incidence of Kidney Disease in juvenile chinook released in 1980 was virtually nonexistent. The University of Idaho will continue to monitor and run experiments to provide us with management data concerning Bacterial Kidney Disease.

During the fish year, the tagging crew marked approximately 127,000 pre-smolts with an adipose fin clip and coded wire tag. Approximately 87,000 of these were marked during April 1980. Tag retention appeared to be approximately 96% for all release groups. The tagging projects included approximately 100,206 branded fish with coded wire tags and an additional 10,000 were branded without tags as a control. Approximately 39,000 fish from the April branded group, were hauled to Lower Granite Dam, and later trucked and released below Bonneville Dam.

Smolt emigration from the hatchery began during the third week of March and the last fish were forced from the earthen ponds on 22 April. Visual observation at the trap indicated that most of the juvenile chinook had migrated out of Rapid River by the second week of May. All pond lights were turned off **in** early January in order to ensure a normal daylight-dark photo period for at least 6 weeks prior to the normal emigration time.

The fish reared for the spring chinook reintroduction program were planted at White Sands Creek in the Lochsa drainage during April 1980. These fish, approximately 157,440, averaged 21.1 per pound (9.5/kg) and averaged 105.0 mm in length at the time of release.

Rearing Problems - Diseases and Treatments Used

Disease losses on this group were low, although some minor problems did exist. Incidences of Gill Disease, Cold Water Disease and Sunburn were all present during the fish year. Control measures with Malachite Green and Cutrine were fairly successful in preventing major disease outbreaks.

Conversion Rates

Net production for the fish year was determined to be 229,689 pounds (104,167 kg). A total of 273,450 pounds (124,014 kg) of Oregon Moist pellet fish feed used to obtain this production. The resulting feed conversion was 1.19:1.

Spring Chinook Juveniles - 1979 Brood Year

Enumeration

On 1 October 1979, approximately 4.3 million eggs were on hand in incubators at Rapid River Hatchery. These originated from Rapid River adults spawned during August - September 1979. The resulting fry were moved to the raceways as they accumulated approximately 1,650 temperature units (°F). All fry were in the raceways by 25 February 1980. The loss percentage from eyed eggs to fish placed in the raceways was determined to be 5.9%.

In May, approximately 3.1 million fingerlings were moved from the raceways to the earthen rearing ponds. An additional 293,250 were transferred to Red River rearing pond in the Clearwater drainage.

Rearing Problems - Diseases and Treatments Used

During late summer, approximately 989,531 fish had migrated from the Rapid River rearing ponds, over the self-cleaning pond screens. These screens have been proven inadequate for maintaining fish inventories. At the end of the fish year, nearly 2.4 million fish were on hand to be planted in the spring of 1981.

Losses due to disease during the fish year for this brood group were again minimal, although the same problems of Gill Disease, Cold Water Disease and Sunburn were prevalent. These diseases seem to cycle annually at this hatchery as noted in the "disease log". Treatments with Cutrine and Malachite Green provided some control.

Spring Chinook - 1980 Returns to Rapid River

Duration of Run

The first adult spring chinook entered the Rapid River trap on 12 May 1980. Adults and jacks, classed as spring run fish, continued to arrive at the trap through 23 July. The peak of the run occurred during the week of 9 June.

Enumeration

During May, June and July 1980, 1,960 chinook salmon were counted at the Rapid River trap. This included 432 jacks (22%), 1,482 four-year-olds (76%) and 46 five-year-olds (2%). Age classes were determined again this year, by length frequency.

Tag recoveries from our coded wire tagging program (Table 7) indicated that possibly length frequency was not too accurate for age class composition this year. Prior years tag recoveries did show a close comparison between our length frequency method of aging fish and known release year tags. Further tagging programs may be necessary to obtain additional aging data for spring chinook.

Rapid River Hatchery again made a significant contribution to both the Columbia and Snake River fish runs. Returns to Rapid River Hatchery made up approximately 3.2% of all spring chinook counted over Bonneville Dam and approximately 29% of the Lower Granite Dam count.

Observation of Injuries to Chinook Returns

Incidences of injuries to chinook adults made up approximately 16% of the run (314 fish). Injuries were classified as gaff wounds (106), gill net (77), hooking (10), nitrogen blisters (113), and other (8). All injuries were treated with a strong solution of Malachite Green applied directly to the wound.

Prespawning Mortality - Treatment of Adults

All of the returning spring chinook salmon were measured at the trap and examined for wounds, tags, brands and other marks. With the exception of 135, all adults were injected with a formulation of Erythromycin at the rate of 5 mg per pound of fish body weight. The uninjected group were marked as a control to monitor mortality differences. The drug injections are a continuation of a cooperative Kidney Disease study with the University of Idaho.

All fish were ponded at the hatchery and treated twice a week with Malachite Green for fungus control. During July, when water temperatures increased, the incidence of fungus on adults was quite high. Control measures with Malachite Green flushes, at the rate of 1 ppm, proved to be only partially effective.

A total of 1,528 adults were ponded at the hatchery during May, June and July. Some 432 jack salmon, which are not used for spawning, were killed, cleaned, double wrapped, frozen and given to the Nez Perce Tribe and charitable institutions. Prior to ponding, 10 fish died in the trap. Trap mortality numbers were substantially lower than in past years, probably due to the lower return numbers, and some minor improvements to the trap structure. After the adults were ponded, 192 males and 289 females died prior to spawning, a total of 481 fish (30.0%). Total prespawning mortality including both trap and pond losses was 30.5%.

During the entire holding and spawning season, nearly every fish carcass was checked for Kidney Disease lesions and causes for mortality. A total of only 38 visible Kidney Disease lesions were noted. Eight of these fish with Kidney Disease lesions were from the uninjected control group of 135 fish. The remaining 30 fish with Kidney Disease lesions had all been injected with Erythromycin. The most evident cause for mortalities seemed to be fungus invasion. Flush treatment with Malachite Green helped control fungal outbreaks, but increased control is desirable. This next season, further research will be done to provide management data for fungus control.

Throughout the season, a total of 17 fish were observed showing symptoms of jaundice. The method of injecting Erythromycin was thought to be the cause. Therefore, all injections were changed from a "dorsal sinus" to a "subcutaneous" injection beginning 1 June.

Further incidences of jaundice did not occur throughout the remainder of the holding period.

Adult injections with formulations of Erythromycin have proven to be beneficial at this hatchery, and should be continued in order to reduce prespawning mortalities due to Bacterial Kidney Disease.

Spawntaking Operations and Enumeration of Eggs

Spawntaking operations started on 9 August, and were completed on 8 September 1980. A total of 543 females were spawned to produce approximately 1,757,000 eggs. Nearly all females were classified as four-year-olds, which produced an average of 3,235 eggs per female. The largest spawntake of the season occurred during the week of 24 August, when nearly 939,000 eggs were taken from 285 females. The eggs this season, averaged 111 per ounce (3.91/ml).

All eggs taken this year were water hardened in a 2 ppm solution of Erythromycin as part of a continuing study of Bacterial Kidney Disease by the University of Idaho. Experimental groups of eggs and fry will be monitored each week throughout the incubation and rearing period to check for the presence of Kidney Disease bacteria. At this time, it appears evident that water hardening eggs in a solution of Erythromycin will be beneficial to the hatchery program.

Marked Fish Returns

All spring chinook entering the Rapid River trap were examined for tags and marks. Coded wire tagged fish made up a sizeable percentage of this year's return (3.2%). A total of 62 tags were recovered during this year's operation. These were returns from three different brood year groups.

Tag returns from three-year-old fish (jacks), totaled 13, which were from the 1977 brood year group in which 250,200 fish were marked and released in 1979. Fish returns this season, classified as jacks, totaled 432 or approximately 22% of this year's run count.

Tag returns from known four-year-olds totaled 35. These were from the 1976 brood year group of 131,367 marked smolts, released in the spring of 1978. Total returns this season, classified four-year-olds by the length frequency method, was determined to be 1,482 or approximately 76% of the run.

The number of five-year-olds in the fish run totaled only 46 this year. This number represented approximately 2% of the run. Tag returns from known five-year-olds totaled 14. These were returns from 254,945 marked 1975 brood smolts, released in the spring of 1977.

Tag return data, recovered each year, has provided us with much useful information. Past years data showed a close correlation between age determination based on length frequency, and known brood year tags. This year, checking lengths of wire tag returns of known brood year fish, we found inaccuracies in classifying fish by length. Many of the smaller fish that would have been classified as jacks by hatchery personnel proved to be four-year-olds. Also, most of the known five-year-olds would have been classified as four-year-old fish.

The small sample of coded wire returns this season (62), has given us a look at a useful tool of the anadromous fisheries program. It will be interesting to see in future returns, how closely our past methods of aging follows the wire tag data. It appears that we should continue the coded wire tagging program to learn more about proper size and release timing for each hatchery.

Distribution of Eggs, Eye-up Percentages - 1980 Brood

All eggs taken this season were placed in incubators at Rapid River Hatchery. Approximately 94.5% survived to the eyed stage. The resulting eggs, nearly 1.7 million, will be kept for rearing to meet part of Idaho Power Company's mitigation requirements.

Harvest - Sport and Indian Fishery

Due to the extreme low run of spring chinook entering Idaho, it was again necessary to close the season to sport fishing. Nez Perce Indians harvested, in Rapid River, some chinook destined for the hatchery trap.

Summer Chinook - 1980 Returns to Rapid River

Enumeration

Chinook, totaling 25, were classed as summer run fish arriving at the trap after 23 July. These were all released above the trap into Rapid River. The trap was taken out of operation on 30 July, and no further attempts were made to monitor their numbers.

Inventory of Miscellaneous Species in Rapid River

Steel head

A total of 55 steel head were examined at the Rapid River trap between the dates of 4 April and 31 May 1980. This total was comprised of 19 males and 36 females. These fish ranged in length from 24 to 30 inches, of which 10 had adipose fin clips. All steelhead were released above the trap to spawn naturally and no attempts were made to recover snouts from the adipose clipped fish.

Dolly Varden

During the time the trap was in operation in 1980, a total of 219 Dolly Varden were observed. These fish varied in length to a maximum of 26 inches (660 mm). Many fish were in the 18 inch (457 mm) size class. It appears that Dolly Varden populations may be somewhat improved now, as compared to past years. All bull trout were released above the Rapid River trap. Dolly Varden is probably the most sought after species in the sport fishery on Rapid River.

Other Species

In addition to the species listed above, one rainbow trout, two cutthroat and seven whitefish were captured in the trap. Rearing habitat for these other species is apparently somewhat limited, at least in the stream section where the trap facility is located. No rough fish were captured this season.

Hatchery Improvements and Maintenance

During the fish year, several improvements and maintenance items were accomplished at Rapid River Hatchery. A concrete dividing wall was installed in rearing pond number two, to facilitate handling of juvenile chinook. Some fish are being reared in this pond for release in the Hells Canyon area of the Snake River. A much needed freezer unit was installed, near the rearing ponds, for feed storage. The old freezer space will be converted to an office area in the near future.

Due to extreme lumber deterioration, division panels were replaced in one adult holding pond. Minor repair to rearing ponds included hauling in gravel fill and sloping, to aid draining and smolt removal. Picnic tables in the park area were also replaced.

Improvements to the trap facility included the installation of a small mobile trailer unit to be used by enforcement personnel, when necessary. A sewer and water system was also provided for the trailer unit. A new padding system was installed in the adult trap holding area. This provided some additional protection for the adults to further minimize trap mortalities.

Other work scheduled for this fall, includes building painting, leaf screen repair, and modification to the walkway bridge at our water control structure.

Public Relations

During the year approximately 3,500 people visited Rapid River Hatchery. A substantial decrease in their numbers was noted compared to past years. Several factors explaining this reduction might include: higher gasoline prices, lack of a salmon sport fishery and problems regarding Indian fishing conflicts on Rapid River.

RECOMMENDATIONS

Project Problems

Several facility problems still exist at this hatchery, and should be reviewed by Idaho Power Company and the Idaho Department of Fish and Game. As noted in previous project reports, this installation is in need of a new incubation building with water filtering capabilities. The present incubation buildings are deteriorating due to standing water problems, and are not designed for maximum efficiency.

The absence of adequate storage buildings still remains a problem. Equipment such as pumps, tools, lawn tractors and other grounds maintenance items are presently left outside in the weather. We also lack an area for paint, oil and chemical storage.

Housing for temporary employees is also very inadequate, having no water or toilet facilities. These people work and live under these conditions for four to six months a year.

The pond screening systems also remain a problem. The "low head" screens will pass fish at any time, making it impossible to maintain an accurate fish inventory. The intake screening system for the hatchery also needs replacement or modification. Leaf and debris deposits have built up in the rearing ponds due to the faulty intake screening system.

As a result of inoperable screens, debris accumulations have caused some annual bacteria problems in fish rearing.

Spawntaking areas and fish feeder systems are also in need of repair or modification.

Research Projects

As indicated in past annual reports, research has been very beneficial to the success at Rapid River Hatchery. Without Kidney Disease control methods developed by the University of Idaho, adult returns to Rapid River would be greatly lessened.

Currently, a *Vibrio* vaccination project is scheduled for mid-February for a group of approximately 50,000 pre-smolts. An additional 50,000 will be used as a control, and all will be coded wire tagged. These fish have been kept in the concrete raceways and are approximately 10 fish per pound smaller than pre-smolts in the ponds of the same age class.

Future coded wire tagging programs have been proposed to evaluate size of chinook smolts. In the event that adult returns from smaller smolts would be just as good as returns from larger smolts, annual feed costs might be reduced and the occurrence of disease problems might be lessened.

ACKNOWLEDGMENTS

Thanks is due to Rodney Duke and the other coded wire tagging personnel; Dr. Klontz and his staff from the University of Idaho; Anthony Novotny of the National Marine Fisheries Service, and Idaho Power Company maintenance personnel.

The station was staffed by Evan M. Parrish, Superintendent III; Thomas Levensdofske, Superintendent III; Thomas Rogers, Superintendent I; Jerry McGehee, Fish Culturist; Chris Randolph, Bio-aide; Ross Clay, Laborer; Ronya Smith, CETA; Eric Lym, CETA; Jack Siple, Superintendent I; Bill Senkosky, Bio-aide; Elayne Parrish, Laborer; Darcia Reiner, CETA; Joe Galli, Laborer; Steve Fiedler, Laborer and Peggy Tadhunter, CETA during the past fish year.

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Parrish, Evan M. Annual Performance Report, May 1980. Idaho Department of Fish and Game. 25 pp.

Annual Reports of Rapid River Hatchery 1964 - 1979.

Table 1 (a). Egg shipments: 1 October 1979 - 30 September 1980.

No egg shipments were made during this period.

Table 1 (b). Fingerling shipments (1979 brood) 1 October 1979 - 30 September 1980.

Destination	Number	Kg	Pounds
Red River Pond	293,250	1,157	2,550
Totals	293,250	1,157	2,550

Table 1 (c). Smolt shipments (1978 brood) 1 October 1979 - 30 September 1980.

Destination	Number	Kg	Pounds
White Sands Creek (Lochsa River)	157,440	4,354	9,600
Totals	157,400	4,354	9,600

All shipments are of eggs, fingerlings and smolts in addition to Idaho Power Company's mitigation requirements.

Table 2. Summary of smolts released into Rapid River.

Brood Year	Number of smolts released	Year of release	Average length		Number per		Total weight	
			mm	in	kg	lb	kg	lb
1964	580,000	1966	121	(4.8)	49.8	(22.6)	11,639	(25,644)
1965	480,000	1967	117	(4.6)	51.1	(23.2)	9,383	(20,690)
1966	1,460,000	1968	116	(4.6)	55.1	(25.0)	26,484	(58,400)
1967	900,000	1969	118	(4.6)	52.9	(24.0)	17,006	(37,500)
1968	3,172,000	1970	127	(5.0)	44.1	(20.0)	71,925	(158,600)
1969	2,718,720	1971	123	(4.8)	46.3	(21.0)	58,711	(129,463)
1970	2,809,200	1972	128	(5.0)	42.8	(19.4)	56,747	(125,132)
1971	2,908,425	1973	129	(5.1)	37.5	(17.0)	79,358	(174,989)
1972	2,707,917	1974	128	(5.0)	38.6	(17.5)	69,005	(152,162)
1973	3,373,700	1975	137	(5.4)	32.6	(14.8)	105,987	(233,708)
1974	3,654,640	1976	125	(4.9)	40.6	(18.4)	87,638	(193,206)
1975	3,170,922	1977	134	(5.3)	35.1	(15.9)	90,986	(200,640)
1976	2,413,678	1978	136	(5.4)	33.6	(15.7)	69,679	(153,643)
1977	3,018,448	1979	138	(5.5)	33.0	(15.0)	97,330	(214,612)
1978	2,811,593	1980	136	(5.4)	33.0	(15.0)	85,175	(187,810)
1979	3,377,415 ^{1/}	1981						
Totals 39,466,658							937,053	(2,066,203)
Average 2,466,666			128	(5.0)	41.8	(19.0)	62,470	(137,747)

^{1/} Includes all fish from the 1979 brood year still on hand at the hatchery on 1 October 1980, and 989,531 fish that emigrated from the ponds in late summer, 1980.

Table 3. Returns of Spring Chinook salmon to Rapid River Hatchery, survival to spawning, and enumeration of eggs.

Brood Year	Snake R. returns (adults)	Rapid R. returns (Adults)	Rapid R. returns (jacks)	Mortality prior to spawning	Number of females spawned	Number of eggs per female	Number of eggs taken
1964	349			16%	182	4,874	887,000
1965	408			21%	133	4,541	604,000
1966	1,511			18%	621	3,697	2,296,000
1967	974		1,039	11%	581	3,537	2,055,000
1968	351	3,416 <u>1/</u>	740	2%	1,809	3,671	6,540,000
1969	672	2,817 <u>1/</u>	1,043	8%	1,415	3,655	5,151,697
1970		6,470	887	10% <u>2/</u>	3,520	4,136	14,560,280
1971		3,357	1,754	19%	1,722	3,507	6,038,785
1972		12,310 <u>3/</u>	943	15%	3,825	3,941	15,072,604
1973		17,054 <u>3/</u>	286	37%	3,454	3,912	13,510,465
1974		3,457	538	27%	1,756	3,924	6,890,186
1975		4,428	573	7%	2,184	3,894	8,503,606
1976		6,342	1,765	15%	3,055	3,762	11,492,878
1977		7,767 <u>3/</u>	437	11%	3,781	3,745	14,160,330
1978		5,735	34	21%	2,350	4,266	10,026,888
1979		3,054	350	31%	1,141	4,950	5,648,722
1980		1,528	432	30%	543	3,235	1,756,827
Total:	4,265	77,735	10,774		32,072		125,195,268
Average:	711	5,980	770	20% <u>2/</u>	1,887	3,956	7,364,428

1/ Adults over the 2,700 holding capacity at Rapid River Hatchery were hauled to Stolle Meadows and to McCall Hatchery.

2/ Until 1969, mortality rates were figured on losses prior to the beginning of spawning. After 1969, any fish that had not successfully completed spawning was included as pre-s^pawning mortality.

3/ Adults over the 8,000 holding capacity at Rapid River Hatchery (7,000 in 1977) were planted in the Little Salmon River, Salmon River, and the South Fork of the Clearwater River.

Table 4. Length frequencies of Spring Chinook entering the Rapid River trap, 1972 - 1980 (Fork length)

<u>Length</u>										
in	cm	1972	1973	1974	1975	1976	1977	1978	1979	1980
Third Year of life (Jacks)										
13	33.0	0	0	0	0	0	0	1	0	1
14	35.6	0	0	0	0	0	0	0	1	0
15	38.1	53	9	11	.5	4	1	2	4	4
16	40.6	89	20	27	21	50	12	7	11	19
17	43.2	136	35	80	93	114	28	1	30	52
18	45.7	196	64	91	114	311	77	4	61	103
19	48.3	160	59	75	139	463	115	4	93	120
20	50.8	125	41	53	114	445	110	2	88	95
21	53.3	113	33	32	41	233	58	9	39	35
22	55.9	41	13	59	15	75	19	4	18	18
23	58.4	12	7	37	31	30	7	161 <u>1/</u>	6 <u>2/</u>	78 <u>3/</u>
24	60.9	<u>18</u>	<u>5</u>	<u>117</u>	<u>69</u>	<u>40</u>	<u>10</u>	67 <u>1/</u>	7 <u>2/</u>	178 <u>3/</u>
Subtotal		943	286	582	642	1,765	437	117 <u>1/</u>	358 <u>2/</u>	703 <u>3/</u>
% of run		(7.1%)	(1.6%)	(14.6%)	(12.8%)	(21.8%)	(5.3%)	(2.0%)	(10.4%)	(35.9%)
<u>Fourth year of life</u>										
25	63.5	123	85	70	126	143	84	240	57	311
26	66.0	382	341	250	377	361	292	655	69	376
27	68.6	1,009	1,006	379	736	869	879	1,025	75	298
28	71.1	2,154	2,473	423	1,106	1,324	1,848	895	47	137
29	73.7	2,938	3,367	273	920	1,217	2,138	512	40	57
30	76.2	2,745	3,104	159	521	858	1,221	242	88	25
31	78.7	<u>1,415</u>	<u>1,978</u>	<u>100</u>	<u>187</u>	<u>443</u>	<u>648</u>	<u>238</u>	<u>214</u>	<u>7</u>
Subtotal		10,766	12,654	1,654	3,973	5,222	7,110	3,807	598	1,211
% of run		(81.2%)	(73.0%)	(41.4%)	(79.4%)	(64.4%)	(86.9%)	(66.0%)	(17.8%)	(61.7%)

1/ Includes 63 small adult fish that were spawned - true jack count is 34 fish, 0.59% of the run

2/ Includes 8 small adult fish that were spawned - true jack count is 350 fish, 10.3% of the run

3/ Includes 271 small adult fish that were spawned - true jack count is 432 fish, 22.0% of the run

Table 4. (Cont `d)

<u>Length</u>										
in	cm	1972	1973	1974	1975	1976	1977	1978	1979	1980
<u>Fifth year of life</u>										
32	81.3	726	921	146	110	232	245	362	414	11
33	83.8	271	717	260	96	217	122	483	525	10
34	86.4	160	905	376	77	215	92	458	485	11
35	88.9	98	631	358	51	176	74	303	455	8
36	91.4	105	716	298	27	151	38	136	291	4
37	94.0	86	256	190	13	78	26	63	131	0
38	96.5									
or larger		<u>98</u>	<u>257</u>	<u>131</u>	<u>12</u>	<u>51</u>	<u>37</u>	<u>40</u>	<u>112</u>	<u>2</u>
Subtotal		1,544	4,403	1,759	386	1,120	634	1,845	2,413	46
% of run		(11.7%)	(25.4%)	(44.0%)	(7.7%)	(13.8%)	(7.8%)	(32.0%)	(71.8%)	(2.4%)
Total run		13,253	17,343	3,995	5,001	8,170	8,181	5,769	3,361 <u>4</u> /	1,960

4/ We did not measure the 43 fish that died in the trap, total run was 3,404 fish.

Table 5. Summary of the returns to Rapid River Hatchery, by age class of Spring Chinook smolts released, 1964 - 1980.

Returns (number & percent) by age class												
Brood Year	(smolts) Year of release	Number released	Type Mark	3rd yr. of life		4th yr. of life		5th yr. of life		Total		No. of smolts per one adult return
				No.	%	No.	%	No.	%	No.	%	
1964	1966 (sp)	51,181	LP*	76	.15	?	?	?	?	?	?	126
	1966 (sp)	536,820	None	963	.18	?	?	?	?	?	?	
Total	1966	588,000		1,039 (22%)	.18	3,422 (73%)	.58	197 (5%)	.03	4,658	.79	
1965	1966 (fall)	14,590	RP*	?	?	13	.09	3	.02	?	?	115
	1966 (fall)	14,670	Y(rt)**	?	?	0	.00	8	.05	?	?	
	1967 (sp)	20,000	LP*	?	?	19	.09	3	.01	?	?	
	1967 (sp)	20,000	Y(lt)**	?	?	0	.00	2	.01	?	?	
	1967 (sp)	410,730	None	?	?	2,588	.63	856	.21	?	?	
Total	1966-67	480,000		740 (18%)	.15	2,620 (63%)	.55	874 (19%)	.18	4,234	.88	
1966	1968 (sp)	50,000	LV*	54	.09	348	.70	14	.03	416	.83	208
	1968 (sp)	50,000	Y(rt)**	0	.00	97	.19	7	.01	104	.20	
	1968 (sp)	1,360,000	None	989	.07	5,115	.38	343	.03	6,447	.48	
Total	1968	1,460,000		1,043 (15%)	.07	5,596 (80%)	.38	364 (5%)	.02	7,003	.48	
1967	1969 (sp)	25,000	LV*	48	.19	205	.82	29	.10	272	1.08	166
	1969 (sp)	25,000	R(rt)**	1	.01	88	.35	8	.03	98	.40	
	1969 (sp)	25,000	R** LV*	27	.11	85	.34	5	.02	117	.47	
	1969 (sp)	825,000	None	811	.10	2,614	.32	1,502	.18	4,927	.60	
Total	1969	900,000		887 (16%)	.10	2,992 (55%)	.33	1,544 (29%)	.17	5,416	.60	
1968	1970 (sp)	25,000	LV*	5	.02	43	.17	4	.01	52	.21	187
	1970 (sp)	25,000	R(lt)**	3	.01	21	.08	4	.01	28	.10	
	1970 (sp)	25,000	R** LV*	0	.00	6	.02	0	.00	6	.02	
	1970 (sp)	3,097,000	None	1,746	.06	10,686	.35	4,395	.14	16,827	.54	
Total	1970	3,172,000		1,754 (10%)	.06	10,766 (64%)	.34	4,403 (26%)	.14	16,923	.53	
1969	1971 (sp)	48,500	N(lt)**	12	.02	177	.36	6	.01	195	.40	177
	1971 (sp)	102,000	R(rt)**	27	.03	119	.12	15	.01	161	.16	
	1971 (sp)	99,000	R(lt)**	19	.02	212	.21	11	.01	242	.24	
	1971 (sp)	2,469,200	None	885	.03	12,146	.49	1,727	.07	14,758	.60	
Total	1971	2,718,700		943 (6%)	.03	12,654 (60%)	.47	1,759 (10%)	.06	15,356	.56	

Table 5 (continued)

1970	1972 (sp)	200,000	Ad- $\frac{1}{2}$ An*	7	.01	54	.02	21	.01	82	.04	
	1972 (sp)	<u>2,609,108</u>	None	<u>279</u>	<u>.01</u>	<u>1,644</u>	<u>.06</u>	<u>265</u>	<u>.01</u>	<u>2,288</u>	<u>.08</u>	
Total	1972	2,809,200		285 (12%)	.01	1,698 (72%)	.06	386 (16%)	.01	2,370	.08	1,185
1971	1973 (sp)	201,547	Ad-an*	18	.01	233	.12	41	.02	292	.14	
	1973 (sp)	<u>2,706,876</u>	None	<u>520</u>	<u>.02</u>	<u>3,973</u>	<u>.15</u>	<u>1,079</u>	<u>.04</u>	<u>5,572</u>	<u>.21</u>	
Total	1973	2,908,425		538 (9%)	.02	4,206 (72%)	.14	1,120 (19%)	.04	5,864	.20	496
1972	1974 (sp)	100,374	R(lt)**	0	.00	89	.09	14	.01	103	.10	
	1974 (sp)	170,775	R(rt)**	26	.01	121	.07	22	.01	169	.09	
	1974 (sp)	<u>2,436,768</u>	None	<u>547</u>	<u>.02</u>	<u>5,012</u>	<u>.21</u>	<u>598</u>	<u>.02</u>	<u>6,157</u>	<u>.25</u>	
Total	1974	2,707,917		573 (9%)	.02	5,222 (81%)	.19	634 (10%)	.02	6,429	.23	421
1973	1975 (sp)	343,278	R(rt)**	49	.01	272	.07	82	.02	403	.12	
	1975 (sp)	<u>3,030,422</u>	None	<u>1,716</u>	<u>.06</u>	<u>6,838</u>	<u>.22</u>	<u>1,763</u>	<u>.06</u>	<u>10,317</u>	<u>.34</u>	
Total	1975	3,373,700		1,765 (17%)	.05	7,110 (66%)	.21	1,845 (17%)	.05	10,720	.32	315
1974	1976 (sp)	136,606	Ad-CWT*	9	.007	95	.07	93	.07	197	.14	
	1976 (sp)	<u>3,222,334</u>	None	<u>428</u>	<u>.01</u>	<u>3,795</u>	<u>.12</u>	<u>2,320</u>	<u>.07</u>	<u>6,543</u>	<u>.20</u>	
Total	1976	3,358,940		437 (6%)	.01	3,890 (58%)	.11	2,413 (36%)	.07	6,740	.20	498
1975	1977 (sp)	50,475	R(rt)**	1***	.002	1	.002	0	.00	2	.004	
	1977 (sp)	254,945	Ad-CWT*	2	.001	22	.001	14	.006	38	.02	
	1977 (sp)	<u>2,865,502</u>	None	<u>32</u>	<u>.001</u>	<u>575</u>	<u>.02</u>	<u>32</u>	<u>.001</u>	<u>639</u>	<u>.02</u>	
	1977	3,170,922		34 (5%)	.001	598 (88%)	.02	46 (7%)	.002	678	.02	4,677
1976	1978 (sp)	131,250	Ad-CWT*	12	.009	35	.03	inc.(1981)---	inc.	---	---	
	1978 (sp)	<u>2,282,428</u>	None	<u>338</u>	<u>.01</u>	<u>1,447</u>	<u>.06</u>	<u>inc.(1981)---</u>	<u>inc.</u>	<u>---</u>	<u>---</u>	
Total	1978	2,413,678		350	.01	1,482	.06	inc.(1981)---	inc.	---	---	
1977	1979 (sp)	250,200	Ad-CWT*	13	.005	inc.(1981)---	inc.(1982)---	inc.	---	---	---	
	1979 (sp)	<u>2,616,793</u>	None	<u>419</u>	<u>.02</u>	<u>inc.(1981)---</u>	<u>inc.(1982)---</u>	<u>inc.</u>	<u>---</u>	<u>---</u>	<u>---</u>	
Total	1979	2,866,993		432	.02	inc.(1981)---	inc.(1982)---	inc.	---	---	---	
1978	1980 (sp)	123,527	Ad-CWT*inc.(1981)---	---	---	inc.(1982)---	inc.(1983)---	inc.	---	---	---	
	1980 (sp)	<u>2,688,066</u>	None	<u>inc.(1981)---</u>	<u>---</u>	<u>inc.(1982)---</u>	<u>inc.(1983)---</u>	<u>inc.</u>	<u>---</u>	<u>---</u>	<u>---</u>	
Total	1980	2,811,593		inc.(1981)	---	inc.(1982)---	inc.(1983)---	inc.	---	---	---	

Table 5 (continued)

* LP, RP, LV, RV, Ad- -An, signify left or right pectoral fins clipped, left or right ventral fins clipped, adipose and ₂ of the anal fin clipped, adipose and anal fins clipped. Ad-CWT signifies that the adipose fin was clipped and a coded wire tag was implanted in the snout of the fish.

** "Y", "R", "N", signify the letter brand placed on either the left or right of the fish. *** One jack returned with an adipose clip-coded wire tag, and an "R"brand on the right side.

Table 6. Weekly arrival numbers - 1980, Spring Chinook returns

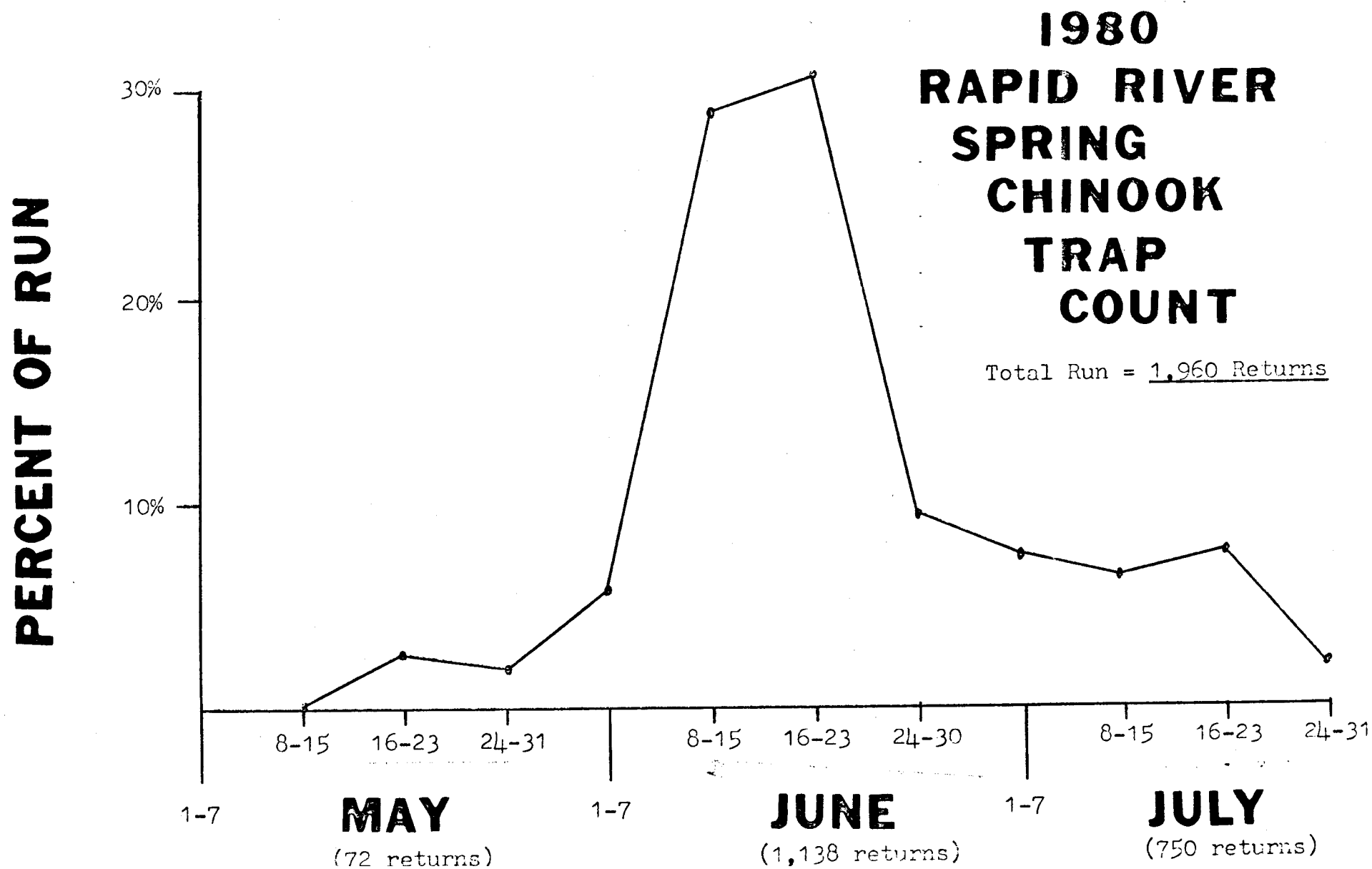


Table 7. Summary of coded wire tag data collected from Chinook returns – 1980

Brood /Release year /year	Length		No. Males	No. Females	Total No. at given length
	cm	in			
1975 / 1977	61.0	24	0	1	1
	66.0	26	1	1	2
	68.6	27	2	0	2
	71.1	28	2	1	4*
	76.2	30	1	0	1
	81.3	32	1	1	2
	99.1	39	0	1	1
	111.8	44	0	0	1*
Total			7	5	14
1976 / 1978	43.2	17	1	0	1
	45.7	18	1	0	1
	48.3	19	3	0	3
	50.8	20	4	0	4
	55.8	22	2	0	2
	61.0	24	3	1	4
	63.5	25	2	0	2
	66.0	26	2	0	2
	68.6	27	4	5	9
	71.1.	28	1	4	5
	73.7	29	0	1	1
	86.4	34	1	0	1
Total			24	11	35
1977 / 1979	45.7	18	3	0	3
	48.3	19	2	1	3
	50.8	20	4	0	4
	55.8	22	2	0	2
	71.1	28	0	0	1*
Total			11	1	13

- 1 unknown sex

